

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

JUNE 5, 1950



Bob Bridge at Salt Lake City knows!

"It's quite a drop onto our runway off the Wasatch Range back of us," Mr. Bridge tells us, "and the mountains send down a lot of heavy weather. So our high intensity runway lights are extremely important. Our air-lines and pilots like them, and I wouldn't want to run an airport without them!"

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LINE MATERIAL Airport

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Westinghouse is constantly striving for improvement in jet propulsion . . . so provide only the best for the United States armed forces in its privileged to serve.

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How 5 airlines land the big ones

BOEING STRATOCRUISERS now fly the colors of five major airlines—Pan American World Airways, North-west Airlines, American Overseas Airlines, British Overseas Airways Corporation, and United Air Lines. The craft member of Stratocruisers used by these lines is well over 500 feet long and is every one of them, the main wheel assembly and nose wheel assembly are completely B. F. Goodrich—wheels, brakes, tires, and tubes.

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Robert F. Ryan

column

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AND NOW -

Mid-Continent Airlines, serving the great cities of the Central Plains from the Dakotas and Minnesota to Texas and Louisiana, is the 14th major airline to improve its service by replacing the Convair-Lear. More than 1,100,000 passengers have passed this, for operational economy, ease of maintenance and over-all top performance, the Convair-Lear has no equal in the two-engine commercial transport field.

**IN THE AIR—IT'S
CONVAIR**

MID-CONTINENT ADDS CONVAIR-300s

One of Mid-Continent's new Convair-300s for express service departs for the Midwest. These 40-passenger 300-m.p.h. Convair dual-engine ships are said to make airlines everywhere here

from cities more than 500 mi. apart go faster than ever. The new Pratt & Whitney 1600-hp. engines are lubricated exclusively with TEXACO.



New ships for express schedules are lubricated exclusively with TEXACO

Mid-Continent Airlines has just put into operation its new "Convair-300 Fleet" — pressurized and air conditioned transports that provide new speed and comfort for passengers, on express schedules throughout the heart of America from Minnesota to the Gulf.

Mid-Continent Airlines has always earned service and dependability—a fact proved by flying over 500 million passenger miles safely in 15 years. In line with its insistence on quality, Mid-Continent has, from the start, used Texaco Aircraft Engine Oil exclusively.

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TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

Shown in ... TEXACO STAR TRAINER serving MILTON SERIES on scheduled every Tuesday night. See newspaper for time and station.

Missiles and Planes in the News



WESTLAND WYVERN T.E. 1, single-seat turboprop fighter in a new flight now.



GRUMMAN AF, closed to be target single-engine plane being, has sub-rocket motor.



TOP SERGEANT SA-1 pilotless fighter has 100-lb. motor turned by engine at top.



ITALIAN TRAINER, Aerobici 5-7, is planned to prepare pilots for jet planes.



NIKE, solid-powered army anti-aircraft missile, has four thrust boosters rocket on tail.



TARGREEN, Bell Aircraft Corp.'s 12,000-lb. bomb, can be guided during descent by electronic commands from homing radar.



What's the success secret of Shell Airport Dealers?

One Example: Shell's PLANNED UPGRADING of aircraft fuels and lubricants...

Planned upgrading of fuels is shown in the new Shell 80/87 aviation fuel. This 80-octane fuel with a guaranteed minimum rich mixture rating of 87-octane was made available by Shell on a nation-wide basis in 1949. It is the fuel which has engine-makers' demand approved for many models in place of 70-octane*.

Planned upgrading is also evident in the many Aviatool Lubricants which meet the most exacting needs of modern aircraft. Such product superiority is the result of looking ahead, of anticipating needs, of continued research on a long-past basis.

*Note that an equivalent of 80 octane for aircraft 80/87 aviation fuel is necessary for engine models.

PLANNED UPGRADING
is one of the three main reasons of "Shell's Success" which are:

1. Shell's Planned Upgrading of aircraft fuel and lubricants.
2. Shell's Planned Lubrication service.
3. Shell's Planned Maintenance program.



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WHO'S WHERE

In the Front Office

Heures E. Lewis, Jr., has been made vp. of Shellco, Inc. He was formerly connected with two subsidiaries of Air Reduction Sales Co.—in product of Ohio Chemical & Manufacturing Co., and vp. of Acushnet Corp. He also has been manager of operations research and act. director of research and engineering.

Max Geo. Roger S. Colton has been named president of Federal Telecommunications Laboratories, Inc., according to **Donald H. Hubert**, who has been appointed vp. and deputy technical director of International Telephone and Telegraph Corp. Gen. Colton at one time held a lot of engineering and technical work of the Signal Corps and as communications officer at the Air Technical Service Command at Wright Field. Hubert was associated with International Telephone and Telegraph since 1936.

Changes

With the Minneapolis-Albert H. Blum group has joined **Clara L. Martin** Co.'s public relations staff to handle community relations. **Stephen H. Benschel** is a new staff member of Rock America Corp.

Robert E. Ward has been named chief metallurgical of magnesium products for Aluminum Co. of America. **Charles J. Moody, Jr.**, has joined Airborne Instruments Laboratory as assistant of technical affairs. **George C. Hansen**, who formerly held that position, is now working for Radio Corp. of America in the broadcast sales division.

With the Airlines-John H. Rogers has been made cargo sales agent at Radio Alaska division of Pan American World Airways. Rogers formerly has been made district office manager for Pacific in Haiti. **W. Victor Skutumpah** has joined Texaco as a travel agency relations expert.

Thomas J. Hove has been made American Airlines manager of cargo sales in the east air region. **L. B. Ridge** is Commercial Air Lines' new manager of passenger service, replacing **Frederick Pisk**, transferred to Delta as its new district traffic and sales manager in that city.

Honors and Elections

Paul W. Leitchfield, chairman of the board of Goodrich Tire and Rubber Co., has received a special award from Air Service Post 591 of the American Legion in recognition of his 30 years as aviator. **Travis Ward**, Aviator President Ralph S. Dumas has been elected a member of the board of the Commerce and Industry Area of N. Y.

S. D. Danahy, secretary of the National Aircraft Manufacturers Council, has been awarded an honorary certificate by the American Standards Assn. for his work in developing industrial standards. **C. E. Mead** has been elected a vp. of Lear, Inc.

INDUSTRY OBSERVER

Latest experimental version of the multi-purpose British Bristol Freighter is being fitted with a four-bay layout of top and bottom for maintenance purposes on heretofore inaccessible main-gear land. Hopper is designed for removal from damage through nose doors, so the plane can be used as ordinary freighter if desired.

Fuel experts predict kerosene will power economical turbine-powered planes rather than special high-priced fuel blends. Shell and Esso chemists say that if produced in sufficient quantity for commercial operations kerosene will probably cost about 3 cents a gallon less than aviation gasoline. Marketable aviation gasoline prices are expected to go up when kerosene comes into large quantities because of storage and supply problems encountered in handling two different types of fuels.

First flight of the Pavesi X4-35 twin-engine transport helicopter is due in mid-1952. Funds to complete two of the craft are being allocated in 1951 fiscal year Air Force funds. Meanwhile component parts are already being constructed at the Pavesi Marine, Va., plant, where the making of the big rotor, designed for both transport and rescue, has already passed airplane board approval.

Increasing the range of many large military aircraft by use of wingtip tanks and underwing tanks is the rule. Chance VC-122 assault transport is expected to increase its range to 4000 mi. with tip tanks Douglas C-124A, Lockheed P3V Neptune are others with wingtip versions. Apparently underwing tank arrangement for Boeing B47D is adaptable to B-26 and to C-97 Stratofreighters, as well.

First operations of Allison T-36 turbo-prop engine on powerplant for the Convair Turbojet which General Motors purchased will probably be on an experimental basis, in order to get the plane into the air as soon as possible. But Allison still plans to test CAA certification of the engine. Schedule now calls for delivery of first T-36 to Convair at San Diego in June and second in July.

First test inspection use of the newly certified Westinghouse J34 jet engine is expected to be as good auxiliary powerplants along under the wing tips of the Boeing Stratojet. Pan American World Airways is reported much interested in this means for improving the performance of its Stratojet. Boeing engineers anticipate the extra check performance and increased gross weight capacity, enough to fly the Atlantic both ways saving New York to London, regardless of winds, and increased fuel economy.

Boeing Superjet flying boom aerial refueling tankers have been designated KB-29s and are in quantity production with the first 29 at the boom tankers already in service. They are designed for night refueling at Boeing B-50s. It is expected that the same system will be used later in refueling the Boeing B-47 night bomber.

ECA report to France purchase of Pratt & Whitney R-4160 engines and other U.S. built aviation equipment for use on the big French SE-200 transport four-engine transport, ordered in December that the new R-4160-C engine rated at 4900 hp has not yet been placed for export. The French wanted this engine rated of the earlier version that are getting R-4160-B-11 rated at 5700 hp. In event the later engine is delayed for export 1952, the French are expected to sit in addition ECA grant of \$2 million to make up the difference in price, and get the newer engine. (See story on page 13.)

American National de Colombia (Aerones) is weighing the purchase of Douglas DC-6s in Lockheed Constellation. It now operates DC-4s.

Shipping out of military-to-civil defense conversion is giving defense planners pause. Recent cost study indicated that to deliver one city of Washington's size against an air raid using the Navy's rocket aircraft, would cost about 540 millions to launch down 750 modular air planes, or \$180 million for a 1000-plane raid.

Convair Builds New Turboprop Transport

Production stopped on Convair-Liner; all-new plane to replace it.

By Alexander McManis

Top manufacturer of Convair's Vultee Aircraft Corp. had built last week and came up with a new surprise set of signals for Convair's next step in the turbo-prop turboprop plane.

What the air transport industry needs is a completely new transport airplane specifically designed for turboprop engines, and Convair is the company to build it, they decided.

Decisions as announced by LeRoy T. Colby, Convair president, and Floyd B. O'Brien, Convair board chairman, mean a major policy shift. Company sales strategy, up until now, has been centered on the Convair-Liner. The airplane was being developed on behalf of new Convair-Liners with necessary model changes to use the turboprop. Now the Convair-Liner production line is chopped off, once and for all. The decision is lowering a new "Vultee" for their customers, about the Convair turboprop transport, successor to the Convair-Liner.

Colby said that the new transport was already in an advanced planning stage, "and will be designed aerodynamically and structurally with simple elements for all integrated elements into turboprop power."

Probably a major factor in the decision was the realization that the Convair-Liner conversion to turboprop power may not be able to deliver the power plant promised from the turbo-prop new line design.

■ **Allison Turbo-Prop-Airplane Week** learned last week that the Allison T-35 turboprop, an expected to develop an output of 3750-horsepower shaft hp at 18,000 rpm, tested at the 3750-horsepower shaft hp at which the engine is currently rated. Convair's new 2400 hp Pratt & Whitney power engines, to turbo-prop with only 2500-horsepower shaft hp at 18,000 rpm, is not as "crisp." But because this power is a full third more than that supplied by the Allison engine is another story.

Now for the new transport plane to be swept wings, and tail surfaces, and



POWERPLANT MATCHED: Nozzle of T-35 turboprop engine for Convair Turboliner is larger than that of Convair-Liner piston engine (left) engine, but turbine unit is lighter.

large turboprop engine is not yet clear. But the main appeal of these "superior" advantages of design is an important factor for consideration along with the unquestioned requirement in aerodynamic efficiency.

■ **Non-Interference-**The Convair position and that the new program would not interfere with interest plans to convert a Convair-Liner to Allison T-35 turboprop power for the General Motors Corp. Now will it change plans to build turboprop modifications to be used in the new Convair-Liner, as that they can convert them to T-35 power.

It is seemed that the converted Convair-Liners may be placed at a subsonic speed within the limits of the present altitude if the potential of the T-35's power is realized. (Convair built 200 of the Convair-Liners, claims to have lost "nearly \$10 million" in the program (Aviation Week Jan. 2).

The new plane announcement obviously is a shared concern more against the Martin 404 transport which will start out and spin in a policy power plant, but now being held as designed for ready conversion to turboprop power.

Nonstop routes which have been proposed for the North American T-1 turboprop into the next story with the Convair announcement, left apprehensive that that report might be used as the new Convair transport. It is under the fact that the 16,000-shaft hp turbine is not being considered for the Convair project which will be basically a two-engine Convair-Liner replacement of about equal passenger capacity.

Special emphasis will be placed on very high utilization of the plane, as design features aimed at quick loading and dumping of passengers, and ease of maintenance.

SAC Sock

Few B-36s operational, Strategic Air Command relies on wartime types.

By Ben S. Lee

SAC Headquarters, Omaha—Nearly five years after V-J Day, the backbone of the USAF's long-range striking force is still the modified bomber of World War II—not the B-36. If the USAF had to go into action today with long-range bombers, they would be mostly B-29s and B-50s, relying on aerial refueling for extreme range missions.

Despite widespread publicity of the big six-engine Convair B-36 as a weapon in being, few of these are operational at the present time although well over 100 have been built.

Many of the B-36s already delivered have been sent back for modifications at Ft. Worth and San Diego. The B-36s are being converted into B-36s and the B-36s are being converted to B-36s by the addition of four jet engines in pods under the wing tips. None of the original B-36s have yet been delivered.

■ **Combat Readiness-**Based on a basis of combat mission, right now, here is the big Strider of the USAF

would stack up, as well as in Western Europe by SAC spokesmen at Offutt AFB, command headquarters.

Strategic Air Command plans overall calls for 19 groups of planes. Fourteen are heavy bomber groups and thus are strategic reconnaissance groups.

Today SAC has three B-36 bombardment groups, none of which is completely equipped, and a fourth group is set for conversion. The other 11 groups are divided between 7 B-36 and 8 B-29 groups. To bring up the long-range capabilities of these 11 groups to range comparable with the B-36, and as a backup in planning, SAC has group strength of these units is being increased by B-29 aerial refueling.

■ **Jet Conversion-**All three reconnaissance bomber groups are being World War II B-29. The 9th RB wing (Fairfield-Hamilton AFB, Calif.) and the 24th RB wing (Grand City, S. D.) are scheduled for conversion to B-36s while the 91st RB wing (Barksdale, La.) will get B-36s as replacements for its B-29s within the next 15 months. The acquisition of the 91st wing, however, is undergoing jet bomber transitional training at Langley AFB, Va., with North American B-45C bombers. When training ends it returns to be used as a strategic reconnaissance North American B-45C reconnaissance bombers.

SEB later the 91st wing is expected to become an all-jet reconnaissance wing, as the B-36 and the B-45 will be retired by Boeing B-47s, when the swept bombers are ready for delivery.

■ **A Year for Strength-**Neither of the B-36 groups will build to group strength with the jet reconnaissance for training. Later they will be returned to Ft. Worth for conversion.

Two of SAC's B-29 bomber groups are later scheduled for replacement by B-47 groups as soon as production of the jet bombers permits. Eventually the bomber strength of SAC will include four B-36 groups, two B-47 groups, 5 B-29 groups and five B-29 groups.

SAC plans call for reconnaissance and bomber type units on each group on a 3:6 ratio. For reconnaissance bombers of the B-36 type only, the ratio will be 1:2 with B-36s performing only bomber missions.

SAC has been told to spend less on heavy bomber and reconnaissance forces than. Recently the 1st air force which controls SAC—the 15th, Main AFB, Calif., 1st, Grenville AFB, Tex., and 3rd, Barksdale AFB, La.—is to give control of a strategic reconnaissance wing. Formerly, all strategic reconnaissance was charged to the 2nd Air Force.



ARMAGNAC U.S. dollar to finance competition for U.S. builders and operators.

French Planes Completed by ECA

Transports for Air France ocean service needed P & W engines; ECA buys them and U. S. lines complain.

By Alexander McManis

A different twist in ECA foreign aviation financing last week provided U.S. overhauls and equipment for eight French four-engine Air France 80-passenger transports on order by Air France.

ECA funds totaling \$4.5 million will buy 34 Pratt & Whitney Wasp Major R-1150-B11 engines rated at 1900 hp each, plus propellers, accessories, and

equipment and air conditioning for the planes.

The Air France is most closely comparable to the Boeing Stratocruiser among U.S. transports, but is larger and slower. First prototype Air France had flown 120 hr as of last May 11.

The plane is a product of Societe Nationale de Constructions Aeronautiques de Sud Est, at Marseilles, France. Model designation of the Air France is S.N.C. 2021.

ECA indicated recently that it did

ECA Aviation Procurement

Breakdown of Economic Cooperation Administration's procurement commitments for aircraft, engines, parts, accessories, instruments and ground handling equipment shows the following purchases since April 3, 1948 in round figures:

France	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	\$37.2 million
Italy	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	4.5 million
Netherlands	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	2.8 million
Belgium	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	2.8 million
Greece	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	0.9 million
Denmark	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	0.9 million
Sweden	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	0.9 million
Switzerland	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	0.9 million
Additional, not shown in above totals	100 transports and 100 engines, parts, accessories, instruments and ground handling equipment	0.95 million
Total		\$76.6 million

U. S. Aircraft Purchased Through ECA

Airbus of U.S. transport aircraft purchased in whole or in part with ECA funds since April 3, 1948:

- France: 30 Constellations, 9 used DC-4s and 2 used Constellations
- Italy: 3 DC-4s
- Netherlands: 2 Constellations, 6 DC-4s, 12 Convair Liners
- Belgium: 6 Convair Liners
- Denmark: 2 DC-4s
- Norway: 2 DC-4s

Total aircraft purchased: 11 DC-4s, 10 Constellations, 18 Convair-Liners, 9 DC-4s.

Liaison Entries

Piper PA-19, Cessna Model 305 are leading contract contenders.

First domain in the 500-plus Army liaison contract was being weighed last week, following completion of Air Force evaluation flight tests on four competing planes at Ft. Rucker, N. C.

Unofficial sources indicated that Cessna's aircraft Model 305 and Piper's PA-19 are leading it out for first place. The Cessna, due to its more powerful engine, apparently holds the edge as far as performance is concerned. But on a basis of comparative engine prices alone, it is assumed the Piper entry plane would be the lower, and that this factor might be a strong influence in the decision if the performance differential were relatively slight.

Of 14 manufacturers originally submitting interest in the USAF's invitation to bid, only five presented prototypes, and one of these was damaged in preliminary flight tests (Fitch). The five competitors were Cessna, Piper, the Voughtcraft 18, Luscombe T-9FL, and the Fitcher PL-21.

Requirements established by the Army call for a plane which can:

- Carry a crew of two
- Cruise at 75-knot speed at not more than 75 percent power
- Climb at a maximum rate of 500 ft. min. for first minute.
- Fly slowly with no loss of altitude with a full gross load and full control at not more than 61 knots
- Have a service ceiling of not less than 17,000 ft.

• **Fitcher PL-21**—The Fletcher aircraft PL-21 served at Wright Field for preliminary test several days after the other entries. It was descending from an altitude climb test when control surfaces were overloaded and damaged. The Air Force test pilot and observer bailed out. The Fletcher plane leveled out upside down, and landed in that position, with considerable damage. Plans were taken back to the Fletcher plant at Pasadena, Calif., for repairs, but these were not completed in time for it to make the flight-test deadline at Ft. Rucker.

Investigation sources told Aviation Week that the plane had not been finally disqualified from the competition. Indications were that the PL-21 may be permitted to take a special "safety" evaluation test, with results to be considered along with performance of the other five planes.

Performance figures and specifications quoted by the manufacturers for the entries:

- **Cessna Model 305**—Cruising speed at 5000 ft. at 75 percent power, 90 knots;

observing speed at constant altitude with full control, 45 knots; maximum at cruising speed, 90 knots; fuel, 5.1 hr., rate of climb, 1200 ft./min., ceiling, 12,000 ft., takeoff over 50 ft. obstacle, 160 ft. (full field), landing run over 30 ft. obstacle (and field), 600 ft.

• **Piper PA-19**—Cruising speed with 20 gal. at 5000 ft., stall speed without flaps, 45 knots, stall with flaps, 42 knots, takeoff ground run at 1100-lb. gross, 200 ft., landing ground run same conditions, 160 ft., maximum fuel capacity, 42 gal.; gross weight (under CAR part 3 utility category) 2200 lb.; maximum gross weight (under CAR part 3 aircraft category) 2450 lb.; empty weight, 1440 lb.; wing loading, 32.1 lb./sq. ft.; power loading, 11.01 lb./hp.; powerplant, Continental C-190, six cylinders, rated at 211 hp. at 1600 rpm for takeoff, and 180 hp. at 1300 rpm second stage.

Plane is all-metal high-wing design, using some parts of the commercial Cessna Model 179 four-place. The Model 179 parts used include steel-wing with integral wing built-in flap, all portions of fuselage, and tail section, and vacuum spring steel landing gear. New features include folding rear seat under panels which fold out of aircraft's way when not in use, and new design control yoke. Performance figures quoted are at sea level, standard day conditions, 2200 lb. gross weight, full field, unless otherwise noted. Wing span is 35 ft.; height, 7 ft. 6 in.; length, 25 ft.

• **Piper Model PA-20**—Plane is a rubber-veneer version of the new commercial Super Cub PA-16. Powerplant is a 135 hp. Lycoming engine. Takeoff over a 50 ft. barrier required is less than 600 ft. at 1750 lb. gross weight. Empty weight is 1070 lb. Plane will carry enough fuel (57 gal.) for use for cruising

with 100 lb. arm load with two passengers, 80 lb. of fuel and 60 lb. maximum baggage equipment.

Paper engineers state the plane will meet or exceed the Army requirements for the competition, previously stated. Obvious differences between the PA-19 and the rubber PA-16 Super Cub, are in the more powerful engine, modified cockpit with greater Plexiglas area in top and rear windows, and a large shelf all of our seat for radio, radio and navigation equipment. Construction is steel tubing fuselage and metal structure wing fabric covered.

• **Luscombe T-9FL**—A military version of the aircraft before. Plane carries a crew of two, 40 hp. radio, and 60 lb. maximum baggage equipment. Powered by a Continental 99-15 developing 90 hp. Gross weight is 1520 lb., empty weight is 950 lb. Takeoff with full load over a 50 ft. obstacle in 495 ft. and landing run over a 50 ft. obstacle in 575 ft. is reported. Takeoff is 115 mph.

The T-9FL can be flown under 40 mph. It will stall with power on and flaps at 33 mph. Plane features a wing engine mount and instrument panel mounted with dual battery. 75 percent of parts are interchangeable with 180A. All metal construction.

• **Taylorcraft Model 18**—Is powered by Lycoming 2000 engine developing 125 hp. Gross weight is 1780 lb., empty weight 1080 lb. Payload is 620 lb. in climbing 40-lb. radio and 60 lb. maximum baggage equipment. Takeoff over a 50 ft. obstacle is 104 ft. It can land in 500 ft. after clearing a 50-ft. obstacle. The plane carries load for 6-lb. range at a cruising speed of 130 mph. Top speed is 125 mph. Rate of climb first minute is 940 ft. Cruising speed is approximately 40 mph.

Measure Would Streamline Research

Legislation streamlining military research and development has been introduced by Chairman Clifford T. Webb, one of the members of Senate Armed Services Committee and Chairman Civil Veterans of the House Armed Services Committee.

- The measure would:
- Give the three military agencies a free hand to establish advisory committees for research and development activities.
- Remove legal prohibitions to the employment of scientific personnel who are foreign nationals by the military departments.

• Permit cost-type contracts, up to a five-year period, for research and development projects. The terms of the contracts could be extended if appropriate.

- Authorize the departments to provide for their facilities and equipment in research and development contracts.
- Authorize the three agencies to provide that the government will indemnify contractors against liability for death, injury, or property damage to employees, "inasmuch as a result of risk defined in the contract to be unusually hazardous."

Urge An Appraisal

Air Research Army, with membership of 25,000 Active Air Force officers, is urging that President Truman appoint a new commission similar to the Fletcher Commission to make a reappraisal of American power in light of post-war world situation.



CESSNA 305



LUSCOMBE T-9FL



TAYLORCRAFT 18



PIPER PA-19



J-47 REHEAT UNIT

General Electric has developed the afterburner unit for its J-47 jet engine (left) and flow turbine.

It is approximately 1500 lb. The photo shows engine's increased length over the standard

model because of change of afterburner's exhaust gases through the reheat turbine. The unit is also designed to operate under various flight and power con-



ditions. This could J-47 be fitted to the new Republic XF-105 and North American F-105A aircraft. There are three J-47 engines currently in production J-47-GE-13, J-47-GE-14 and J-47-GE-15.

Domestic Airlines Continue Gains

Most carriers show a substantial improvement over their first-quarter earning records of last year.

The domestic airlines continue their consistent improvement in earnings accompanied by bolting of their credit. This is demonstrated by the results of the first quarter of this year, and by the preliminary indications of April and May traffic.

But selectivity in earnings is more pronounced than ever before. In fact, the combined results of the 16 domestic airlines, if taken as a group, would show an estimated net loss of around \$6 million for first-quarter 1950 as against an adjusted \$5 million loss for the same 1949 period. Northwest Airlines, with a net loss of \$1,612,036, recorded the most drastic one-half of the industry's current net deficit and detracts the group's record of total accomplishment.

• **Better Than Usual**—Following the century experience of Northwest, the industry's first quarter—traditionally the worst for most carriers—shows relatively good over corresponding periods of past years. Previous first quarter results for the 16 domestic airlines:

- 1948—A deficit of more than \$118 million.
- 1947—A deficit of more than \$187 million.

It must be recognized that these staggering losses were accompanied by modified operations by reductions and layoffs. Nevertheless, even after such adjustment, it is probable that the 1950 showing represents the best in the last four years.

The 1947 and 1948 first quarters reflected a series of bad crashes, equipment grounding and inclement weather conditions. The fact that substantial carriers were scheduled during the 1949 first quarter indicates that gains would be for the first period in 1950, a tangible evidence of the improvement in the safety and dependability of air transportation.

A significant measure of the current gains in earnings power is available through an examination of the results of the "Big Five"—accounting for between 75 to 90 percent of the domestic traffic. These carriers—American, Eastern, United and TWA—showed a combined net loss of about \$5.3 million for the 1949 first quarter. The same group reported a net loss of less than \$3.7 million this year. This improvement would have been greater if not

for the 31-day strike on American during March.

Increased efficiency and improved cost control are in evidence for most carriers. This is highlighted by United's quarterly report, the only detailed account which has been issued among the Big Five.

During the first three months of 1950, United's operating revenues were up 4 percent while operating expenses increased only 2 percent. United's operating cost per ton-mile was decreased 3 percent from 1949's first quarter. It dropped from 61.74 to 60.56. Although traffic increased, United reduced its personnel at the end of the first quarter by 612, to 9,477.

• **Let the Credit Go**—United's recent action, involving a stand by credit agreement personally in effect, shows the strengthening of airline credit. Last September when the company ordered five new DC-6s, it arranged a \$3.5 million standby credit with 35 banks in case it were needed to pay for these new aircraft. Delinquency of the five planes will be completely sharply. Payments will be made from the company's current finances without recourse to any new borrowing.

With additional stands on sales and scheduled for delivery only next year, United's demonstrated confidence in its ability to finance all outstanding capital requirements as well as to maintain a heavy debt retirement schedule.

• **Fixed Fuel Costs**—The effect of an agreed fuel price is apparent in the 7.3 percent increase in fuel cost per ton-mile during first-quarter 1950. With revenues, however, increased but 2 percent, reducing the sliding scale of net rates in effect for the Big Five.

As with road carriers, transport results have a very tentative characteristic in view of changing fuel rate proceedings. For United and others in the Big Five, temporary rates are in effect currently and apply also to periods back to early 1949. Until permanent fuel rates are established by the Civil Aeronautics Board, all current results are subject to qualification.

TWA shows a consolidated net loss of \$1,849,049 for first-quarter 1950, as compared with a net loss of \$3,813,019 for the same period in 1949. No indication is provided as to how this loss

in both years was divided by the domestic and international divisions.

Further, TWA is subject to important fuel rate proceedings on both its international and domestic services, and the published statements quarterly report given no indication as to how these fuel compensation questions are handled.

Nevertheless, the TWA performance is noteworthy while total revenues for the current first quarter are down slightly, the company's net loss was cut by more than one-third. A paper comparison with last year's results will be afforded only when the company's reports are filed with the CAA.

It appears that both American and United have advanced their first quarter losses by applying its credits which will be offset by the subsequent profitable periods of this year. This practice leads to smooth and shiny statements in earnings and gives a more accurate picture of results.

• **North-South Profits**—Unlike the transcontinental carriers, each north-south line in Eastern, National, and to a lesser degree, Delta, experience their most profitable season during the first quarter. Comparative first-quarter results for these carriers may be summarized as follows:

Net Profits		
	1950	1949
Eastern	\$1,508,959	\$1,288,067
National	1,041,343	777,919
Delta	272,644	235,479

The operations of Eastern and National reflect tangible results and are not due to any fault. They are their own successful indication of the air industry trend for this year.

• **Capital Gains**—Capital continues its outstanding record of low-cost operation and improved performance over corresponding periods of a year ago. The company showed an operating loss of only \$128,032 for the first quarter of 1950, against the loss of \$151,480 in the 1949 period.

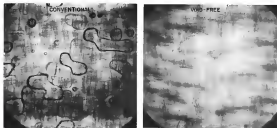
It is also significant that Capital, admittedly a carrier with a substantial fuel rate, has continued to lessen its dependency upon fuel compensation. For example, during the 1949 first quarter, almost 28 percent of its total revenues came from fuel payments. For 1950, this rate was down to about 24.5 percent.

The results achieved by the domestic carriers thus far in 1950 are encouraging portents of continuing gains this year.

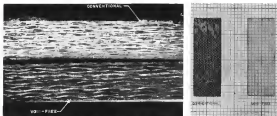
It must be recognized, however, that the fuel gains payable carriers, the full indirect income, are still in effect and may prove a substantial factor in the year's final accounting of net earnings.

—Selig Altschul

AERONAUTICAL ENGINEERING



A 25X MICROPHOTOGRAPH demonstrates latent voids in conventional laminates. Void free material shows only a few thread voids.



CROSS-SECTIONAL comparison of conventional and void-free laminated material showing the larger type of voids, which appear to concentrate in the center of the material.

POROSITY and transparency comparison of void-free and conventional laminates.

Bubble-Free Laminates Stand Up Better

Goodyear finds strength and resistance to rain are greatly increased by making laminates void-free.

Rare and modern have never gotten along well together—but some new developments arising from a program sponsored by Air Materiel Command and carried out by the Goodyear Aircraft Corp. promise to reconcile the two.

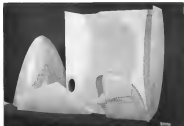
The familiar radome—and many av-

iation are structural part—when made from hollow laminated plastic material, is susceptible to the cracking bombardment of sand-type. The result is rapid deterioration of the material with loss of strength immediately following.

Goodyear hopes that by developing a void-free Nonporous-control laminate,

the two serious problems now when truly solved, and at the same time, improvement of the physical properties of the material was obtained. These findings have been summarized in a report, "Void Free Laminates," by S. D. Bled and E. Dwyer.

• **Background**—The development of liquid polyvinyl laminating resin binders some years back led to their extensive use in low-pressure and non-pressure molding of hollow laminates.



TYPICAL CLOTH and photo-laminated part for the Cessna 441Q. Further include fuselage nose, rubber eye, a back brace and a fin section.

aircraft parts. The smooth surface of these cloth and plastic parts fits them closely for application on high speed aircraft in non-joint structures.

As a result, the laminated products have been used because crowded with enthusiastic users, who were impressed with the ease of processing and the lower tooling involved. There was, of course, more to the matter than met the eye.

For example, little attention was paid to the presence of voids within the laminate, although it had been shown that such voids contributed materially to strength defects in the material. In the case of plastic resin carbon-fiber laminates, physical properties were shown in direct proportion to the absence of voids.

► **Voids**—Two unexplained general causes of voids exist.

► **Extruded bubble type of vacuum** was located along the glass fibers and disrupted "laminar voids."

► **Large bubbles** at voids of microscopic size located between the parts of the fabric or between glass, depicted "large voids."

Two effects contribute to the formation of voids. Residual air may be incorporated into the laminate during forming and not be removed or be irreversibly incorporated, or vapors can be forced by the curing process, which both off volatile components of the resin.

The cure? Proper control of the laminating process avoids both causes and gives a void-free laminate.

It is pretty obvious that a physically perfect material is going to have better properties strength-wise than a piece which is loaded with voids, pits, cracks, and the myriad defects on laminates

formed by low-pressure or vacuum-bag molding. But a less-obvious defect was the factor which truly nearly ruled out glass cloth polymeric laminates for as long as on military aircraft—non-cure (Aviation Week, Apr. 17).

► **Noncure**—First solution of the problem of non-cure was offered by the development of the void-free laminate. These showed a great propensity to the conventional laminate—for example, 5 to 20 times the resistance to stress.

High-speed light made conditions more severe, and so Goodspeed developed a Neoprene coating to protect the laminate. An improvement by a factor of more than 150 resulted from the combination of the Neoprene coating and the void-free laminate.

It was not sufficient to use the Neoprene coating with conventional laminate, though. The void-free materials permitted easier application of a second Neoprene coating; they caused the Neoprene to withstand greater batter; they maintained structural integrity longer.

► **Physical strength**. As would be expected, void-free laminates showed substantial strength margins over the conventional types, when both were fabricated and tested with parallel techniques. A comparison of several void-free laminates showed the void-free material to have 27 to 85 percent more strength than conventional laminates.

► **Water absorption**. The void-free laminate absorbed only about 16 percent as much water as the conventional laminates (tests lasting for either one or seven days).

► **Porosity**. To estimate porosity in conventional laminates, it had been

necessary to vacuum-impregnate the cast material, to incorporate paper in the laminate, or to use coatings. But void-free laminates have been successfully used as pressure vessels because of their very low porosity.

► **Transparency**. Void-free laminated material is quite transparent. This results from the smaller indices of refraction for resin and glass fibers.

The most important application of this property is in quality control, because a quick visual inspection can detect any of the common faults, other than voids, which might occur.

With woodwork structures, the cure and loading of the cure can be checked visually. Inexpensive items can be, or succeed for non-filled cells, as for lack of bonding.

► **Advantages**—General results of Goodspeed's investigation show the void-free laminate to be superior to the conventional on three counts:

- 27 to 85 percent improvement in physical strength
- 5 to 20 times better in resisting stress cracks
- Neoprene and superabsorbent to fluids and gases
- Absorption of only about one-third as much water
- Polished, non-seeing surface
- Transparent to permit easy visual inspection

New British Cabin Air Conditioner

An all-purpose air conditioning track which "plugs in" to aircraft on the ground position to be the British sole tone to the problem of providing a comfortable cabin for passengers as they board an airplane. This track solution is a single unit of all the features necessary to be conditioned an aircraft cabin.

The unit, manufactured by Sir George Colclough & Partners Ltd., operates on the air cycle principle. It is capable of either heating or cooling air, according to decreasing its humidity, saving oil and providing pressure for pressure testing the fuselage.

British Overseas Airways Corp. acquiesced in the design of the track. The company was planning to fly a unit on a York freighter to Calcutta and Karachi for service testing.

Ground air conditioning of aircraft is receiving increased attention by U. S. carriers. It was discussed at great length at the recent Air Transport News Engineering and Maintenance Conference in Kansas City. American carriers agreed that solid waste (waste) units would provide more funds for the purchase of such equipment to cater more completely to passenger comfort.

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- **LOW POWER CONSUMPTION**—under 6 VA, available for 26 V or 110 V operation.
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- **SIMPLIFIED CONSTRUCTION**—maintenance costs are reduced to a minimum.

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Muffler Swallows Turbojet Noise

A portable muffler, which can be packed up against the fuselage of a jet plane to cut down noise while the engine is being run up on the flight line, has been developed by Industrial Sound Control, Inc., Hartford, Conn.

The muffler looks like a large stove pipe placed horizontally, with an elbow at the aft end open to the sky. The jet engine is attached to the straight end and as the turbo sound reaches the aft end, it is reflected to about the level of street noise, the manufacturer reports.

Inside of the pipe has an hourglass shape with the top sections containing two perforations similar to those in an acoustically treated ceiling. Noise trav-

els through these perforations to sound absorbers mounted, then through an other perforated plate into an exhaust retaining chamber.

Perforated tubing to spray water for cooling purposes runs around the inside of the pipe.

This taking current is forced into rings spaced several feet apart. The water spray also helps break up the sound.

The mufflers are designed to withstand temperatures up to 4000 F. with wet packing, says the maker, the hottest element. The roof for cover the water consumption which was a hardship to early attempts at jet sound control.

Offer Finding Guide To German Patents

Copies of German patent applications (abstracts) during the war now can be easily obtained by U. S. firms. The Office of Technical Services of the Department of Commerce has announced the availability of a "finding" guide for these documents entitled "Subject Outline of the Unpublished Applications for Patents Filed at the German Patent Office—1940-1945."

The guide is a subject index to 280,000 applications filed during the period. It divides them into 15 major industrial groups, 88 classes and about 500 subclasses.

The new guide was compiled by the Association for the Diffusion of Documents, Paris, France. OTS translated it for American use.

The Association is offering, for a small fee, microfilm copies of complete patent applications. For not only covers reproduction costs, but the bulk of locating the applications from about 1900 to the end of the war.

Firms desiring to obtain further in-

formation on patent applications in their fields of interest may purchase German language abstracts in the form of printed "98" volumes which are listed in the new finding guide.

Better Screen Grids For Jet Air Intakes

As improved metal screen grid for protecting an intake of turbine engines has been developed by the Aeronautical Research Laboratory of the University of Kentucky, under supervision of the Air Materiel Command.

The new grid has stopped 50-odd shell casing from entering an inlet duct at speeds up to 617 mph. Penalty in using the device is an engine thrust loss of about 5 percent. This compares to primitive grids now used which prevent entrance of foreign objects at speeds around 275 mph and cause a 4 percent loss in thrust.

AMC engineers believe, however, that the final grid developed under the project will be able to stop casings at impact speeds up to 790 mph with a thrust loss of less than 4 percent.

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ENGINEERS NOTEBOOK



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HYDRAULIC LINES TO LANDING GEAR
SHOCK. THIS ASSEMBLY PROVIDES HIGH
SECURITY AGAINST VIBRATION WITH
MINIMUM COMPLEXITY.

**MARMAN
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INGLEWOOD, CALIFORNIA

Giant Hydropress Built for Lockheed

An 800-ton hydraulic press, and is
the largest in the world, is being
built for Lockheed Aircraft Corp. Fab-
rication in the Redhouse Steel Foundry
and Machine Co., Redhouse, Pa.

The Redbank, Calif., company re-
sponsibly will use the press to stamp out
bond-to-work a titanium alloy and struc-
ture steel sheets.

The equipment is designed to take
sheets of titanium alloy 6-8 thick, 10
ft. wide and 30 ft. in length. Machine
also the press in "an example of the
high capacity fabrication equipment
needed to produce high speed aircraft
of the future."

An unusual feature of the mechanism
designed according to Redhouse, is its
flexibility. One can can push button
operate the machine, change pressure,
sequence of operations and speed. It is
designed for drawing and forming work,
requiring making dies, for sheet blank-
ing and for rubber pad work. Press will
be as high as a 3-story building and with
its foundation will weigh more than 14
million pounds.

Flame-Retardant Developed by Martin

A new compound designed to make
fibrous flame-retardant has been devel-
oped by the Glenn L. Martin Co.,
Baltimore, Md.

Product is a protective resin, called
"HFM," which was developed primarily
to meet the need for flame-retardant
coatings and dyes in the Martin
202.

Advantages claimed for the com-
pound is that it is durable enough to
withstand normal handling and dry-
cleaning and does not add noticeably to
weight of fabric. Martin says fabric
treated with this agent means plastic
and soft.

It has licensed the product to E. I.
du Pont de Nemours for further research
work.

This firm is trying to develop a
production process to commercialize it
commercially. Martin says preliminary
tests indicate the compound can be
used with clothing fabrics and other
textiles and that it is specially well
adapted to meet the Army's flame
resistance requirements for clothing ma-
terials.

Dr. Faust discovered and now is
marketing a double flame retardant
called "Kalon" for treating cotton and
 rayon fabrics. According to Martin, the
new product is expected to complement
Kalon.

VISIBILITY



• by Swedlow

F94 Lockheed's new jet fighter for U. S. A. F. is designed to fly and fight in
pitch darkness, with high-altitude interception of enemy aircraft as its principal
function. For quality and dependability, a SWEDLOW produced acrylic enclosure
was selected to protect the pilots and navigators of this latest Lockheed contribu-
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- North American Aviation
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The longest producer of jet aircraft in the world is the Lockheed Aircraft Corporation.

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Lockheed produced the first U.S. operational jet airplane—the famous P-80 Shooting Star, long the backbone of America's fighter defense.

Lockheed leads in the jet training program, too, producing the two-place T-33 and the T-33C jet trainer for the Air Force and the Navy. These are the only jet trainers airplanes produced in America today.

And to win and maintain an especially high safety line, Lockheed has built the long-range, two-place F-50 Jet Performance Fighter.

Now, for high-altitude interceptors, Lockheed is building the new F-106 All-Weather Interceptor, capable of sound-to-sound, sound-to-sound defense.

These dependable Lockheed jets have many natural advantages—speed, strength and maneuverability. And the experience obtained in the design, development and manufacture of these precision jet airplanes is available in the Lockheed laboratories where the plans of the future are being shaped today.

LOCKHEED

Aircraft Corporation, Burbank, California

Look to Lockheed for Leadership

British Turbine Progress Outlined

'Flight' editor feels water-methanol injection and afterburning open way to 10,000-lb.-thrust engines.

British views on key factors of gas turbine power for aircraft were offered by G. Geoffrey South, director, editor of "Flight," at the recent National Aeronautics Meeting of the Society of Automotive Engineers, in New York.

Comments made by this well-known English writer on jet propulsion types, who obviously is familiar with British engineering thinking, covered aspects of development costs, thrust, fuel consumption, gearbox, compressor, power augmentation, and technical losses between U.S. and England.

Acknowledging the enormous progress made in gas turbine power in a comparatively short time in both countries, South noted that the Whittle engine's simplicity in being certified in situ was a major efficiency.

Emphasizing that it requires a large expenditure with access to extensive proving facilities, he held that to bring a modern high-power stream turbine through design, construction and development phases to the stage of service reliability may run as much as \$3.5 to \$11 million, and take a period of 3 to 4 years. And he said that no company could afford to produce a specifically built type turbine plant unless it had potential military utility, hence, military backing.

Higher thrust than South revealed that with the aid of water methanol in jet and afterburning "we can claim to be on the threshold of the achievement of 10,000 lb. thrust from a single unit."

He told the military had not abandoned the centrifugal type turbopost and cited the de Havilland Ghost as being actively developed for the RAF's new high-speed fighters, the DH Venom.

He also mentioned the GE100-P-1000 Rolls Royce jet as being more than 400 lb. lighter than the old Avon.

Cost of development, production and maintenance of the certified compressor is less than for the axial in a same sized, less vulnerable to icing, less susceptible to damage from foreign matter passing through. The efficiency figure, he said, was 75 to 78 percent.

Component efficiency of axial type was set at about 53 percent. Employing a higher compression ratio, a lower specific use of fuel consumption is possible—a reduction of 13 to 15 percent.

He noted, too, that turbine-powered engines now being—Comet, Jetstream, and Viscount—had centrifugal type engines.

As for the GE100-P-1000, he said, not everything being passed on new axial flow types for military service, with current attention being focused on the Rolls Royce Avon and the Armstrong Siddeley Sapphire. These axial-flow jets, now Britain's most powerful types, probably will be in service before the first country's bomber plant.

The Meteor, with its 6250-lb.-thrust Avon, gives that fighter a 10,000-lb.-rate of climb, he said.

He had given the new North American F-86 with its GE J-45 jet, and for the new Allison XT-58 turboprop unit.

For the F-86, South said that "in a particular aircraft it would be more important to quote the rate of fuel consumption for all purposes" but "the day has gone in high altitude, turbine-powered aircraft to quote heat engine fuel consumption we must recognize what is used in the context of aircraft and those other difficulties." He added that axial flow compressors were more sensitive to bleeding for aircraft than were the centrifugal types.

Specific consumption of the high-pressure jet, he said, did not necessarily afford the best indication of suitability for a specific job. He held that some techniques compare turbines with piston engines and tend to disregard savings in auxiliary systems. The turbine powerplant which "can furnish cold air, preheated air and deicing, and incidentally meet 500,000 lb. weight of independent auxiliary, shows to an advantage in that respect over the piston engine."

Service—South disclosed that a British laboratory had reduced the rate of fuel consumption 9 percent in 3 years, through improvement in combustion, turbine and accessories.

Further benefits may be expected through current research on spray characteristics, droplet size, atomized spray distribution and aerodynamic, mechanical and metallurgical improvements. These benefits, coupled with others from study of individual components may allow a further 15 to 20 percent reduction in the fuel specific rate in the next 3 years. And at 6.5 lb. thrust/lb. sea level static and about 11 lb. thrust/lb. at 600 mph in the atmosphere.

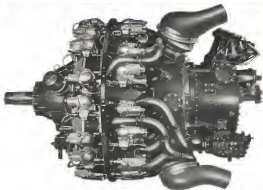
It was disclosed that with improvements in the Comet's Ghost turbines, de Havilland's Vampire 7.5 lb. thrust estimates a further 5 percent reduction in specific fuel consumption figures.

South said that in test runs, the Comet has been down for a stretch of

The WRIGHT 3250 H.P.

Turbo-Cyclone 18

FIRST PRODUCTION COMPOUND ENGINE



Another "First" for Wright Engineering

Mount three blowdown turbines on a piston engine. Utilize the exhaust gases from the piston engine to turn the turbines. Then coast the blowdown... higher power... lower fuel consumption... longer range... for military and commercial operations.

► The Wright Turbo-Cyclone 18—rated at 3250 horsepower—is the first and only aircraft "compound" engine to pass a military model test, go into production and fly in a production airplane.

A Tribute from the Navy

► The Turbo-Cyclone 18 now powers the U.S. Navy's long-range patrol bomber—the Lockheed P3V-4—and the Marine P5M-1. It brings to these aircraft the proved reliability and operating economy of the Wright Cyclone 18 PLUS the lower weight and compactness of the gas turbine.

Endurance—Range—Striking Power

► The selection of the "compound" engine for naval aircraft primarily designed to speeded anti-submarine defense is a tribute of which Wright is justly proud. For in anti-submarine warfare operations, endurance, long-range and heavy striking power are basic requirements... and the choice of the Wright Turbo-Cyclone 18 is based on its unique adaptability to these exacting requirements.

3000 hours successful test time

► Behind the Turbo-Cyclone 18 are over 3,000 hours of experimental ground and flight tests... plus the millions of flight hours accrued by the basic Cyclone in military and commercial service.



MORE POWER TO THE NAVY

Turbo-Cyclone 18 now in production for Lockheed P3V-4

► Wright Turbo-Cyclone 18 power is compounded. The energy of the exhaust gases from the Cyclone's eighteen cylinders—usually vented to the air—is now recovered—harnessed to the three blowdown turbines and fed back to the crank shaft. The energy then recovered is added to that generated by the piston engine's own fuel supply. Result... from the same amount of fuel comes a wide choice of advantages.

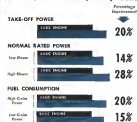
The Advantages "Compounded", Too

Specific fuel consumption reduced as much as 20%.
Range increased 20% on same amount of fuel.
Payload much increased by lower fuel consumption.
Power increased 20% without increase of fuel.
Lower specific weight... approx. 1 lb. per hp. developed.

No Excess Weight to Fly

► Additional bonuses... ease of installation, maintenance, operation... no added controls, no special training of crews, noise suppression.

BONUS... in Dollars, Miles, Pounds



WRIGHT IS PIONEERING IN ECONOMY

Apart from differences in operational requirements, the military and commercial operator share the same need for optimum economy and performance in long-range aircraft. The Turbo-Cyclone 18 is the most advanced aircraft power plant yet developed to fulfill these requirements. It reflects Wright Aircraft's present and far-reaching leadership in creating new and more economical sources of power for air progress.

Wright Aeronautical Corporation, Wood-Ridge, New Jersey

CURTISS  WRIGHT

54 hours with standard luggage, and that the next version will provide more wing luggage (and a bigger landing gear). Tests have been at 35,000-40,000 ft., but, he says, the Comet will go to 45,000 ft.

► **Ignition**—Smith commented on the Royal Aircraft Establishment-developed high energy ignition system. It is not yet in general service use, but has been successfully tried in both test cell runs and in flight. Weight of this equipment, with screened plug lead is approximately 10 lb.

The device has enabled doubling of the torch igniter and its auxiliary fuel

supply, since the electrical discharges produced (1/100 in.) have such high energy and short duration, that each can create ignitable conditions in the combustion chamber—requiring a relatively small quantity of the main fuel spray, thus igniting sufficient volume of the reacting mixture to produce a general "light up."

Recent electrode erosion of the orthodox high-voltage ignition plug was too rapid, a surface discharge plug with a large electrode area was chosen—two hemispherical, conical steel electrodes separated by a .02-in. arc-gap housing compressed into flash with electrode surfaces. The area is coated with

a thin layer of carbon and in normal operation, the plug's position in the chamber insulates the deposit.

An induction coil, operated by a vibrator from a 24v. dc supply, repeatedly charges a condenser through a series spark gap until condenser voltage reaches to about 200kv. Then, the condenser discharges through the sealed spark gap, an inductor and the plug, all in series. Discharge duration is about 50 microseconds peak current about 1,500 amp.

In test cell trials, successful ignition has been achieved over a range of limiting combustion conditions, Smith said, from high pressure equivalent to high flight speed to low altitude to low pressure at high altitude.

In flight trials, successful lights were obtained with several flames up to about 35,000 ft.

► **Amperitization**—Because afterburning equipment requires a penalty of 2.1 percent on cruise fuel consumption, Smith said that the British four water-methanol injection for civil aircraft, just recently for test. Smith quoted an estimated to be a maximum of 10.12 percent. A higher value would be considered to indicate that compressor and turbine characteristics were poorly matched.

► **Turboprop**—Smith said that Britain expects a progressively stronger challenge from America in the turboprop field.

He emphasized British confidence in the relatively low-powered turboprops for civil use, citing the Manx and the Dart.

First British turboprop engine to see regular military service, he said, would be the Armstrong Siddeley Pythia, now being produced for counter-rotating strike planes.

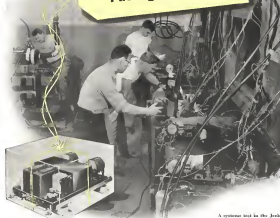
The coupled Manx is being used on new subminiature aircraft. In the series, Smith said, "the compact turboprop, offering cruising economy and high maximum power for climbing on the thrust system already rated."

► **U. S.-British Cooperation**—Summing the numerous benefits to be derived from technical cooperation between the two countries, Smith held that security considerations must not be allowed to stifle liaison. He expressed belief that Britain might consider experimental installation of their most advanced turbine jets in our "logically advanced airplanes."

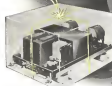
He said that continued technical liaison could materially reduce the critical period between initial conception of turbine power needs and delivery for service.

Standardization of all major parts and accessories should be advanced, at least as it did not impede design, he said, avoiding special, any standardization of ideas.

MEN AT WORK ON Lighter, Smaller Packages of Power!



A systems test in the Jack & Heintz Development Laboratory. Jack's typical system used sealed panel.



For dependability, look to Jack & Heintz—the aircraft electrical specialists—to design, test and produce lighter, smaller packages of power to meet your requirements!



Here's the Subminiature... the smallest, lightest switch in the MICRO SWITCH line!



MICRO...
that name is
precision switch!

Where small space and light weight are important factors, the extremely small MICRO Subminiature Switch meets many tough requirements.

The Subminiature measures .05/.04" long by .36" high by .36" wide... less than 1/10th of the volume and weight of the standard MICRO snap-action pressure switch.

Electrical capacity tests indicate a rating of 5 amperes, 115 to 250 volts ac, and 2 amperes, 28 volts dc.

The MICRO Subminiature is available in a photo-eye and provided with pin plunger actuator. The circuit arrangement is single-pole, double-throw. Terminal are of soldering type. Call or write MICRO 2801 TECB, Freeport, Illinois, or any branch office for complete information.

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Lightness isn't the whole story—
you can often cut costs with Dow

MAGNESIUM

the world's lightest structural metal!



The extra lightness that you get only with magnesium has meant improved performance wherever magnesium has been used. But dead weight reduction isn't the whole story—many leading aircraft designers are finding that the proper use of magnesium can also mean sizable reductions in fabrication and assembly costs.

Finished magnesium castings are not only lighter, but often cheaper than those in other materials because of the ease with which they can be machined. A new high strength extrusion alloy with low notch sensitivity makes it possible to replace many costly built up beams with low cost, efficient magnesium extrusions.

The low specific gravity of magnesium means thicker skin can be used. The greatly increased stiffness obtained reduces the number of stiffeners and formers and permits simplification of the structure with attendant reduction in fabrication costs.

For more detailed information about the use of magnesium in aircraft, write Dept. RM-77 in Midland.

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Magnesium...

Available in extrusions, castings and sheet

A high strength-weight ratio combined with maximum lightness is essential in all forms of magnesium. This desirable combination has been the answer to many difficult design problems. Furthermore, magnesium is readily worked by established techniques.



Fuel Control Studied

A special laboratory for studying problems of fuel system control in high-speed planes has been set up by Chance Vought Aircraft in Dallas, Texas.

United Aircraft Corp.'s fighter plane division built the fuel test lab by converting a paint touch-up building used during the war by North American Aircraft, Inc.

CV engineers say that until some years this type of facility would not have been necessary. But with the advent of high speed, high-altitude craft, the need of gravity has become more critical. The new lab should aid engineers in fuel system design studies and in finding answers to problems of controlling oil shaft within close limits while fuel weight changes at various points in the plane during flight.

The new lab will permit testing of complete fuel systems. It is equipped with a 1000 gal. underground tank and has automatic fire protection.

Aircraft Static Data

Recommended procedures for static grounding of aircraft during fuel servicing are included in a report submitted by the Committee on Aviation and Aircraft Fuel Protection of the National Fire Protection Assn. at its recent annual meeting in Atlantic City, N. J.

Recommendations call for positive grounding to drain static charges in place of previous procedures of merely applying static charges on aircraft and fuel tanks.

The report states that static charges will drain safely where ground resistance is as high as one megohm. It usually permits use of bedwire belts. Special grounding electrodes may be necessary where resistance are characteristically high.

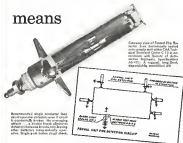
Detailed information on the development of electrical discharge on aircraft during flight, at rest, and during servicing operations are given in the NFPA recommendations. The Association's address is 60 Rutledge St., Boston.

Weather's Lights

A "wing box" at Westinghouse Electric Corp.'s Lighting Division at Cleveland, Ohio, is being used to put outdoor lighting equipment through the paces to see how it will stand up when it is put into actual service. Lighting units are given the equivalent of 20 years of weathering in about 1000 hr. of accelerated testing in corrosive atmosphere. Data should prove interesting to airport operators and equipment engineers.

The wing box uses a salt fog which affects metal in the same manner as salt air at an ocean beach, in the saltwater control or of a major industrial area.

Airline after airline is learning what positive fire detection means



Recommended design features that assure positive detection of fire are shown in this diagram. The sensing element is a thin, flexible, non-oxidizable metal strip which is exposed to the fire. The sensing element is connected to the detector's internal wiring. The sensing element is also connected to the detector's internal wiring.



The Fenwal Aircraft Fire Detector has been designed for positive detection of fire or dangerous overheat conditions. The unit combines the best features of rate of rise and fast temperature devices.

Fenwal Fire Detectors are permanently calibrated. Her-

metically sealed stainless steel unit. Easy to install; single terminal rules out connection errors. No bulky panels, relays, supervisory instrumentation to buy or maintain.

Fenwal, Incorporated, 136 Pleasant Street, Ashland, Massachusetts.

Further information on request

Fenwal

TEMPERATURE CONTROL ENGINEERS

THERMOSWITCH*

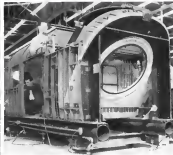
*Reg. U. S. Pat. Off.

Aircraft Fire and Over-Heat Detectors

SENSITIVE...but only to heat



ALUMINUM ARCHES for the HH-49a helicopter are bolted to the fuselage jig. Note ample working room.



NEARLY COMPLETE CABIN FRAME gets instrument panel plate installed. The circular aluminum section is fixed in bolts for 600 hp. Wasp engines.



LIFTED ONTO 370-gal. fuel tank, which is riveted into the cabin, the fuselage gets its skin fitted.

A Copter Grows At Sikorsky



ABOUT 40 PERCENT COMPLETE, two fasteners more along the line. Flight decks have not yet been added.

Sikorsky Aircraft has been busy on an order for five of the big Air Force HH-49A air rescue copters shown in production line photos above. HH-49 has normal gross weight of about 7000 lb. and a military payload of about 2000 lb.

In spite of its size, it can be easily disassembled for storage in a Fairchild C-62 Packet. Ten passengers can be carried in the main cabin in addition to a crew of two on the flight deck. Unique nose mounting of the 600-hp. T500W Wasp engine permits easy access for maintenance and replacement through a pair of clam-shell nose doors.

Sikorsky also has a Navy order for ten of the craft designated HH-49B.

Bendix-Pacific

HYDRAULIC PRESSURE REDUCER VALVES to meet your EXACT requirements

Standardized Bendix-Pacific Hydraulic Pressure Reducers are available from Pacific Division, Bendix Aviation Corporation to meet a wide range of applications for both 3000 and 1500 P.S.I. systems. Three of the valves are illustrated here. This division also offers its engineering assistance for the design of special valves, or the adaptation of Bendix-Pacific standardized valves to meet your exact requirements.



PRESSURE REDUCERS AND RELIEF VALVES

Assembly No. 411250
Standard Unit set at 1250 ± 50 P.S.I.
Assembly No. 411258-2
5000-2000 P.S.I. range of adjustment—
low rate spring
Special versions to meet your exact requirements



PRESSURE REDUCERS WITHOUT RELIEF VALVES

Assembly No. 411258
1200 P.S.I. inlet 1250 P.S.I. outlet
Assembly No. 547658
1200 P.S.I. inlet 450 P.S.I. outlet
Assembly No. 547658-2
1200 P.S.I. inlet 150 P.S.I. outlet

Special versions to meet your exact requirements



PRESSURE COMPENSATED REDUCING VALVES

Assembly No. 411263
1250-1500 P.S.I. plus approx. 20:1 compensation
Assembly No. 411263
1000-1250 P.S.I. plus approx. 8:1 compensation
Hydraulic pressure valves with controlling pressure
Typical application: hydraulic pressure proportion-
ate to test pressure for in-air networking.



Pacific Division
Bendix Aviation Corporation



"A breath of fresh air" at 40,000 feet is not recommended. Fuel-proof cabin pressurization is the key to a pilot's life. A pneumatic brain controls the vital units of PAC's pressure system. Mass Flow Valve, Cabin Safety Valve and Pressure Regulator all function automatically with manual override for emergency operation. Write for Complete Information.

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SALES & SERVICE

Making Executive Travel Safer

FSP director tells CAA: Pilot proficiency should be maintained, but the boss may need some training too.

By Alexander McIsaac

Transportation as it is in multi-engine planes slowly has a good record. But corporate owning planes can make it better still.

Procedures for even safer business air travel in the future was given last week to members of Corporate Aircraft Owners Assn at Washington, D.C. by the director of Flight Safety Foundation, under the name, Mr. Glenn Herlihy, in his opinion.

Presented questions for safer executive flying include:

- Educate the boss in that he doesn't demand the impossible from his pilot
- Adopt written procedures for emergency procedures and equipment
- Require pilots to maintain flight proficiency with periodic flight checks and instrument tests

Lodner's analysis of multi-engine accidents place records show two fatal accidents in 1945 and four in 1949. During those same years domestic air loss averaged 40,000 lb. of flying for each fatal accident. If executive planes and so on, they would have had to fly 2,400,000 lb. in the two years that no fatal accidents are available.

Warning spread dangers of pressure placed on a pilot by an owner in the regard of risk, was given. The boss should be trained to understand that executive flying is the most satisfactory and safe type of transportation, and when properly conducted.

Last of "in a nut shell" for owner presented by the air safety engineers include:

- Don't enter a flight when in the opinion of the pilot it cannot be completed safely and in accordance with regulations
- Don't insist on the crew drinking hard before a flight or standing parties of flight is interrupted within 12 hr.
- Do insist that all newly employed pilots be properly and recently checked out.

Importance of maintaining pilot proficiency was emphasized by the fact that, according to Lodner's analysis, all but one of the 10 fatal accidents in 1945-1949 were attributable to pilot "ineptness."

Two safety pilots are their own judge of proficiency. Lodner contends.

But to back up the pilots' own judgment, he recommended such things as: Regular instrument flight practice under the "hood" and in left crosswind, standard cockpit procedures, weather assessment varying with the competency of the pilot, regular check flights with competent check pilot, study of maintenance procedures by pilots, and a replacement of an airline transport rating for pilots of corporate aircraft.

The flight safety engineer points out the specific danger of overlooking business pilots, and recommends such safety procedures as: Backward seating, shoulder harness, stronger seats and harnesses, emergency lighting, oxygen masks, working fuselage with "knap out" lines for more crew, study of emergency evacuation procedures.

Don Nyring, CAA deputy administrator, quoted CAA studies showing an increase of 143 percent in business flying in the three previous years, as compared with a 57 percent increase for all types of flying except scheduled air carrier.

Sam Grant, Air Transport Assn director of air navigation and traffic control, conducted a discussion on problems for executive pilots in the transition system of the alternative instrument navigation system being de-

veloped by Air Navigation Development Board.

Arthur Godfrey, radio commentator, a commercial user of an aircraft, was awarded the association's 1949 award, for contributing most to the advancement of executive air travel.

William R. Jenkins, of Republic Steel Corp., Cleveland, continues as chairman of the CAA, and N. F. Sullivan has been selected executive director of the organization.

In addition to General Motors Corp., owner of one of the largest corporate fleets of executive aircraft in the country, to the membership of the association, was disclosed at the meeting. The association now includes as members over 80 firms, with more than 45 different types of business and industry represented. Their executive fleets include more than 150 airplanes, of which approximately 120 are multi-engine types.

Authorize Fields Near National Parks

Added stimulus to personal flying is seen in recently approved legislation making possible development of airports near the existence of national parks and monuments. Continued at the new act is authorization of \$2 million to the Department of Interior to carry out the program.

Several airports have been selected for study and are included in the Civil Aeronautics Authority's 1950 National Airport Plan, including a field to serve Yellowstone Park.

CAA recently agreed to include data on parks and monuments on the basis of its national charts, along with a statement requiring pilots to maintain at least 2000-ft altitude so that exact enjoyment of parks will not be disturbed.



SALESMEN VIEW

SUPER NAVION

Ryan distribution took over the new 200 Navion during a sales meeting in San Diego where plans for 1950 were formulated. In fact, it's reported, 200 demand exceeds production, different are being quoted at 2.5



B-52 refueling while enroute, operation in tail of B-52 tanker "Blue" stripping gasoline from left side of this number three.

Gas station in the sky!

The idea of flying gas stations was a popular joke during wartime's early days. Today, it is a reality which Boeing, in co-operation with the U. S. Air Force, has brought to a high state of development with the "flying boom" for refueling airplanes in flight.

Proved practical in actual test flights, the Boeing boom greatly extends the range of bombers such as the great new Boeing B-52 Superfortresses. It enables

possible fast, safe refueling of planes at high altitudes, over the western and east of range of interception.

Details are still secret. But the Boeing boom is far advanced over the method used to refuel the Air Force Superfortresses "Lucky Lady II" when it flew non-stop around the world last year.

The job of designing and manufacturing a successful refueling device

was tackled with characteristic Boeing thoroughness. Designers, engineers and mechanics worked night and day on a well-coordinated team, compressing years of planning effort into months.

They dedicated to the task the same imagination in design and engineering, the same production skills and experience that go into all Boeing products. "Built by Boeing it's bound to last."

BOEING

Built by Boeing for the U. S. Air Force are the new B-47 Strikewall bombers

B-47 Superfortresses and B-52 Superfortresses, for the Army, the G-12 fleet defense planes and for one of the world's leading airlines, the National Boeing Airlines.

NEW AVIATION PRODUCTS



MILITARY tank stripping and cleaning, is made easier with new bond release compound.

Easier Way to Strip Fuel Tanks

New Turco method breaks bond holding sealant to tank, permitting simple peeling of lining from the wall.

A novel and patented approach to the vexing problem of stripping integral fuel tanks has been demonstrated by Turco Products, Inc.

The company has recently put on the market two allied products, Turco 2832 thick and Turco 2832 thin, which strip the sealant from fuel tanks on the bond release rather than on the dissolving principle. Already in use by Lockheed Aircraft Service, Spartan Aircraft and Northwest Airlines, Turco claims that it reduces man hours by as much as 50 percent.

The most serious of aircraft flying today are equipped with integral fuel tanks. The large variety of sealants used in these tanks before several types are used in one tank can be generally classified in three categories:

- **Thickened Type**—Such is present 314 TC-501, TC-46.
- **Synthetic Type**—Such as TC-48, TC-775.
- **Thin Chlorinated-Poly type**, such as RL-2703.

As time goes on, it is the aircraft, tanks develop in the tanks. Some sort of repair method had to be developed. Patching proved to be satisfactory at first, but it was obvious that there was a limit to the number of

times a tank could be patched. The problem, then, was to create a material which would completely remove a sealant and leave the tank clean enough to be reused. The task was complicated by the number of sealing materials involved and by ever changing structures.

• **Two Methods**—There are two schools of thought concerning the most effective method of stripping tanks:

- **"Fill and Flush"** procedure.
- **"Scrape"** method.

Both methods have their advantages. The former requires heavy equipment, the latter less material and equipment. In either case, "scraping" type of stripping dissolves the sealant in the tank, but poses many problems.

In the case of fill and flush, the stripper has to be run through the tank many times in order to dissolve every bit of the sealant and different scrapers have to be used for various sealants. And when most of the sealant has been removed, a thick residue often is left on the floor of the tank.

The contractors for the stripping material so quickly that it has to be changed frequently. If not washed out immediately the residue will re-adhere. This makes usually is difficult to

wash out and in many cases requires the application of an etching agent to make it easily removable.

• **Protection Needed**—Many of the same problems exist with the new-on method, which has the added advantage of requiring complete protection for the workman while in the tank (Polyethylene plastic-coated hoods and respirators). All older types of strippers have very dangerous odors and dangerous toxicity characteristics.

Turco realized that dissolving-type strippers, however effective, would always be costly and cumbersome to use. Turco, working with Lockheed Aircraft Service, built its own headquarters at 6135 S. Central Ave., Los Angeles, got to the heart of the existing problem. The answer was a material which would attack the bond between the sealant and the tank surface.

Advantages of this method of stripping are:

- **Since sealant is not dissolved**—The stripper is only slightly contaminated and can be reused many times, even down dissolving-type. Tests indicate 20 re-uses possible with addition of normal solvent (solvents to replace lost fluid). Thus total cost of stripping is greatly reduced since less stripper is required.

- **The bond-release**—Stripper pulls off sealant in large pieces, leaving the tank so clean that only a water rinse and solvent wash down are required.

- **The material does not burn**—It is named out immediately, as in other methods it continues to work until washed out and does not pose a serious fire or explosion hazard.

- **The Strippers**—Will not require any burners, and its toxicity is minimal.

- **Effectiveness on all types**—Of sealant has been proved in tests.

- **In bond-release**—strips holds true only with synthetic (epoxy or neoprene) rubber sealants, also eliminate party type are dissolved. Only one type of stripper need be stocked.

In addition to these mechanical and application assets, Turco claims that not only are the man hours requirements for stripping not in 30 percent, but the total man-hours of the actual is greatly reduced. Although the "fast time" for the material is about the same as for the dissolving type one fill and flush (plus a little local touch up with thick material to remove stubborn pieces) remains the same.

Turco products bond-release strippers, Turco 2832 thick (for spray on applications) and 2832 thin (for fill and flush) are comparable in price to the dissolving-type materials. Being perfectly suitable, they may be used to obtain any desired economy, maintenance.



You can count on Briles Bolts for extra strength & longer life

The chrome "molly" steel stock is cold-headed. The grain of the stock follows the shape of the bolt head, rather than running vertically through it. After heat treating, the threads are rolled on, forcing the grain to conform to the threaded shape as well—give-up both bolt head and threaded area granular strength, better welding qualities.



You can look on bolts quality of standard steel workmanship for strength from the very first step in the finished A or B or H.A. standard bolt or nut. Briles provides machine and roughing lathe inspection plus material control, giving the highest standard of consistent quality.

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Actuator Motors

Line of information and continuous duty 400 motor with ratings from 1/2 to 1 hp are offered by Lenz, Inc., 110 West Ave., N.W., Grand Rapids, Mich.

These single phase, 115v., and 3 phase, 200v. units are designed to have operating efficiencies as high as 75 percent. They also feature high rate of power output to meet weight. Weights range from 2.1 to 5.2 lb. Last already in using them to power its rotary and linear actuators for controls, and jet engine inlet actuators.

Motors are equipped with integrally constructed a.c. handles to permit quick stopping at rates and load. Four models available are Nos. 10A, 22A-1, 30A, 10B-2, 20B-2A-1 and 30A-2A-1. Specifications for Model 30A-2A-1 (three) are: 3 phase, 200v., 400v., output, 2 hp; speed, 18,900 rpm; starting torque, 200 percent full load; duty cycle, 33 sec. on, 50 sec. off; dimensions, 5 1/2 in. long, 3 1/2 in. d.; weight, 5.2 lb.



New Rectifier

For use in testing laboratories, production lines, for checking radio and other electrical equipment in aircraft, selenium rectifier has been developed by Richardson-Vulcan Corp., 15 W. 30 St., New York, N. Y.

Use of a full wave, 4-phase. In delta 24 to 31v. d.c., 50 amp. current from 3-phase, 220v. a.c., 60c. input. Output is continuously variable throughout 26.5v. range by rheostat control adjustable output.

Regulation is ± 4 percent from 8 to full load. Device has 1.5 percent d.c. ripple, is designed to operate in ambient temperature of 40 C and in convection cooled. Response speed is 0.4 sec.

Voltmeter, ammeter, 6 ft. of 3-phase cord with locking plug, d.c. circuit breaker, a.c. fuses on-off switch and pilot light are included in equipment. It is housed in aluminum alloy cabinet measuring 18 x 34 x 17 in., provided with carrying handles. Weight is 150 lb.



Heater Control

Duct thermostat designed for aircraft heater control is equipped with flexible cable for remote control point adjustment from cockpit or flight engine air stream.

Made by Barber-Colman Co., Rockford, Ill., this thermal sensing element maintains a constant control point with variations in air duct velocity. Stranded fiber measuring elements variations in calibration with changes in air temperature. Maximum thermostat operating temperature is 450 F. and minimum range is 200 F. Stranded control cable lengths are 4 and 8 ft. Electrical connections are explosion-proof.

Potentiometer

Model P-2 electronic potentiometer is offered by Southern Industrial Electronic Co., 2531 Port Oak Road, Houston. It makes precise potential measurements on high impedance electronic cells as electronic tubes and crystals.

Instrument can be used for measuring from 6 to 5 volts in 3 ranges. Current flow in the measured circuit is less than 10⁻¹⁰ amp., making instrument suitable for use with glass electrodes.

Built in standard cell, combined with 0.1 percent potentiometer and dead weight dial, provides accuracy of ± 0.1 millivolt ± 0.1 percent. When any unit can be used for precise pH measurements, having a comparative accuracy of 0.01 pH units.



PHOTOGRAPH COURTESY OF THE LIMAAMBO AIRPORT

A Good Sign to Fly to...

Limaambo Airport handles the large volume of air traffic to and from Lima, Peru. Here in around the world, aircraft owners and operators depend on Esso Aviation Products—products that are constantly being improved by research and development to keep pace with and even anticipate the changing requirements of modern aviation. The Esso winged oval symbolizes petroleum products of uniform, controlled quality backed by more than 40 years of aviation experience.

*All Esso Aviation Products and Esso Aviation Fuel are sold by Esso Aviation Products and Esso Aviation Fuel Company, Ltd.



ESSO EXPORT CORPORATION, AVIATION DEPARTMENT, 25 BROAD STREET, NEW YORK 4, N. Y.

Average Aircraft Stopping Distances

(Ground roll distance in feet from point of touch down to stop)

Plane	Maximum Cruising Altitude ft.	Typical Speed mph	Weight lb.	Braking Distance ft.	Maximum Landing Weight lb.	Maximum Landing Speed mph
Boeing 747-200	45,000	560	735,000	1,100	600,000	130
Boeing 737-400	40,000	500	170,000	1,100	170,000	130
Boeing 737-500	40,000	500	170,000	1,100	170,000	130
Boeing 737-600	40,000	500	170,000	1,100	170,000	130
Boeing 737-700	40,000	500	170,000	1,100	170,000	130
Boeing 737-800	40,000	500	170,000	1,100	170,000	130
Boeing 737-900	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ER	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-2	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-3	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-4	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-5	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-6	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-7	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-8	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-9	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-10	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-11	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-12	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-13	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-14	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-15	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-16	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-17	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-18	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-19	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-20	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-21	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-22	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-23	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-24	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-25	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-26	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-27	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-28	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-29	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-30	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-31	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-32	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-33	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-34	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-35	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-36	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-37	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-38	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-39	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-40	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-41	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-42	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-43	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-44	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-45	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-46	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-47	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-48	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-49	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-50	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-51	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-52	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-53	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-54	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-55	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-56	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-57	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-58	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-59	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-60	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-61	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-62	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-63	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-64	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-65	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-66	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-67	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-68	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-69	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-70	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-71	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-72	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-73	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-74	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-75	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-76	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-77	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-78	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-79	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-80	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-81	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-82	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-83	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-84	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-85	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-86	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-87	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-88	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-89	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-90	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-91	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-92	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-93	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-94	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-95	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-96	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-97	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-98	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-99	40,000	500	170,000	1,100	170,000	130
Boeing 737-900ERX-100	40,000	500	170,000	1,100	170,000	130

Source: ALPA.

Reverse Thrust Scrap Flares Anew

CAB disputes ALPA claims on safety value of reverse-thrust propellers; cost figures are also challenged.

The Air Line Pilots Ass'n is disputing again with the Civil Aeronautics Board over safety and economic aspects of reverse-thrust propellers.

Last February, in testimony on behalf of the American Air Safety Board, ALPA's ALPA president, David L. Bekas, charged that use of CAB's new standards in safety regulations was its failure to acquire information on reverse thrust on all other transports. "Then last week, in a statement before a House Subcommittee and Federal Consumer Subcommittee, Bekas explained that fatalities and property damage resulting from 'overshoot' accidents could have been eliminated or minimized by taking the precaution to use reversible propellers."

► **TWA Crash Report**—CAB, which opposes establishment of an independent Air Safety Board, issued an accident report on one of the deadliest airline disasters could have been avoided. CAB's findings related to the crash of a Boeing 737-400, which crashed into the water off the coast of Florida, were again by blaming the crew for the crash.

The controversial ruling involves a TWA Model L-49 Constellation which failed to stop on the runway during a landing at George Washington Airport last Dec. 16. The craft went through the airport boundary fence, striking a highway and several cars before coming to rest in a grassy area, near one of George's busiest intersections.

Only one passenger was injured. But the plane suffered extensive damage. ► **Crash of Boeing-737** and the possible cause of the accident was the pilot's execution of a final approach at an excessive air speed, and landing too close to the runway. The plane touched down about 1,200 ft from the approach end of the 5,710-ft strip, leaving only 234 ft of usable surface.

The landing followed an ILS approach with ceiling 500 ft, visibility 1/4 mi., unobscured clouds, and moderate fog and smoke. Subsequent tests revealed that the brakes and other

total equipment were operating normally.

"The craft was not equipped with other reversible propellers or reversible nose wheel. Therein, Bekas contends, is the root cause of the crash. 'If the aircraft had been equipped with reversible propellers,' ALPA says, 'it could have stopped in 1,000 ft. Constellation's braking distance is a day's run at 100 mph on a 1,600-ft runway, with brake wear. With reverse props only it can stop in 1,700-1,800 ft, and with full brakes plus reverse props it can make an emergency stop in 1,000 ft.'

"And the (TWA Constellation) was equipped with reverse-thrust propellers it could have stopped without accident itself within the confines of George Washington Airport," Bekas asserted. ALPA points out that even if a plane cannot be stopped on the runway, the reduced speed resulting from reverse thrust will reduce impact damage and reduce the possibility of explosion.

CAB's report indicated that the TWA plane's landing speed was around 150 mph, but that there was no doubt the plane's ability to stop on the remaining 2510 ft of wet runway area with reversible props.

ALPA notes, however, that reverse thrust is most valuable in wet runways. It says that the improved props can reduce stopping distance by about one-third as a dry surface, but the stopping distance is cut in much as 75 percent on a wet or icy runway where the brakes are prone to lockup.

► **Need Increases**—During the past three years, airline planes equipped with reverse thrust propellers have not had a single runway excursion accident, ALPA states. "On the other hand, the list of overshoot accidents involving planes not so equipped grows steadily larger. The trend toward modifying older-type aircraft equipment for air crash avoidance, with passenger safety in mind, is so much as 70, increases the need for reverse thrust."

ALPA emphasizes that reverse thrust provides protection against brake failure. It tends to destroy lifting effect of the wing, causing a stall, and large portions of the wing are lost. Thus, ALPA explains, a greater weight is lost down on the wheels, causing more friction between the tires and runway surface, necessary to ensure safe landings.

While ALPA strongly endorses reversible propellers as an added safety factor to compensate for fuel, heavy planes and wet, icy, rough or short runways, the union holds at present the device to be used for emergency situations. "Under no circumstances," ALPA declares, "should reversible propellers be permitted to reduce runway length requirements or increase takeoff gross load due to shorter start-up distances possible with the installation."

► **Dispute High-Altitude**—ALPA cites 31 U.S. airline accidents since September, 1945, which "might have been avoided with reversible propellers." The union says the first 15 of these resulted in 52 fatalities and \$6,500,000 damage to aircraft. The last 15 of the 23 aircraft accidents since after ALPA recommended to CAB that reversible props be made standard equipment on all airlines.

Bekas says the \$6,500,000 loss in damaged planes would more than cover the cost of all reversible propellers installed. He estimates the new props can be installed on DC-8s for \$15,000 per plane, while DC-7s and Constellations still flying without the device could be equipped for about \$15,000 each.

► **Qualifying Figures**—In a shop across the street, John M. Conacher, director of CAB's Bureau of Safety Regulations, told the House committee that it would cost \$17,120,000 to equip all scheduled airline DC-8s and Constellations with reversible props (Airline News, Apr. 10). Using Conacher's figures, he said cost for 213 DC-8s would be \$18,970,000 (\$89,000 each), and for 64 Constellations still being flown, that \$18,970,000. Additionally, while DC-8s might save money while the planes were out of service for modification.

Conacher believes using reverse thrust on DC-8s, with their non-reversible props, may be economically impractical and, even worse, he declares, Douglas Aircraft Co. estimated it would cost \$10,000,000 (\$10,000 each) to equip the scheduled airlines' 413 DC-8s.

CAB's figures point out an inconsistency in Bekas's cost estimates. ALPA contends the total cost for equipping the airline fleet would be "no more than \$6,500,000." But the union's cost cost is roughly multiplied by the plane affected, give a total expense of \$15,125,000.

Parks Prepares to Activate Routes

Parks Air Lines, East St. Louis, Ill., is making arrangements to activate portions of its 400 mi. northwest feeder system.

Originally awarded to Parks by the Civil Aeronautics Board in 1946 and 1947, the short-haul system's construction has been delayed by financial and operational difficulties. As a result, CAB in June, 1949, initiated an investigation to determine what disposition should be made of the routes.

Less than two months ago, a CAB committee recommended that the Parks feeder system be divided among Trans Airline, Great Air Lines and Mid-Continent Airlines (Airline News, May 3).

► **Two Links Ready**—Parks has disclosed plans to activate its Chicago-St. Louis link, around June 15. It hopes to start Chicago-St. Louis City service July 1. DC-7s have been acquired for the operation.

Like Trans Airline, which finally began feeder service last fall after a long delay, Parks has obtained financial help from a non-scheduled operator, C. A. Bachman, president of Transair Transport Air Lines, Charlotte, N. C., but pledged purchase of several hundred thousand dollars worth of Parks stock, enough to give them a good start.

the limited number of flights they are permitted.

Arno Heacock, president of ATA, and his company, with Golden Numb, Arnold and Transcom Airlines, had asked the CAA to investigate practices at the travel agencies and the airports, air carriers. He also wanted in the help wanted classified advertising column of a Seattle daily newspaper a saving sprout flying to Alaska "for a job before you investigate."

The American and Northwest Airlines, scheduled operations into the Territory, meanwhile are carrying lots of passengers. Pinks carried four plane loads of passengers by May 16, and has charter for some 33 plane loads of business.

The door closed on another group of

potential needed when the Lockheed Verano signed a contract with the Alaska Seismic Industry, Inc., which provides that some members may be flown north only on scheduled flights.

The Lockheeders are the first ones to obtain such an agreement but other issues dealing with the currency operation may follow suit.

Sierracin Passes Lockheed Tests

Sierracin, the new, non-cruising plane material for aircraft windows, has been proven worthy of the confidence it originally held.

As a result of the recent failure of a

Sierracin cabin window on a Model 949 Constellation (Aviation Week Mar. 13), Lockheed has been conducting extensive tests to determine the exact cause of the rupture. The final results, as announced in the Civil Aeronautics Board, indicate that the failure was an isolated case due to stress corrosion.

Since the previous window failure of Model 949 and 740 Constellation was thought, Lockheed recommends that some operations be resumed immediately with the present Lockheed, Douglas, Aerojet or Sierracin windows.

Further window tests of Model 949 Constellation are being made (Lancet or Plexiglas) panels which are not considered satisfactory for continued normal operations, provided no cracking or tearing, or any sort of case for replacement.

As an additional safety measure for Model 949s, Lockheed suggested that outer panels, which heretofore reported no stress, be replaced by full polyacrylate (Sierracin) windows. Tests have indicated that the loss of Sierracin outer panel can safely withstand the sudden pressure applied should the inner window inadvertently fail with some pressure of 8 to 11 psi, the maximum normal cabin pressure is under 7 psi.

Polyacrylate outer windows are more needed instead of acrylic due to the former's resistance to cracking.

Lockheed feels that such an outer panel installation should increase safety of Model 949 window configuration in a crashfield.

SHORTLINES

► **As America**—A CAAI enforcement attorney has asked the Board to discuss its charges against the carrier. One of the largest unincorporated airlines in 1948 and 1949, AA last January was ordered to show cause why its letter of registration shouldn't be revoked for knowing and willful violations of the Civil Aeronautics Act. The carrier stopped operations following the order and in March surrendered its letter of registration for cancellation. Company's application for an air coach certificate is still pending.

► **Alaska Airlines**—Reports \$1,322,565 net loss in \$4,383,047 operating losses for the year ended last Oct. 31, compared with \$152,439 profit on \$3,552,558 operating revenue the previous fiscal year.

► **American Overseas**—Company Statute-charter set a company record of 11 in 37 runs on the 3107-mile run from Saigon, Elze, to New York.

► **American-Elmfield** 73-67 passengers on its transcontinental DC-6 aircraft flights between Apr. 9, when service started, and May 18. Load factor was 65.5 percent. R.E.S. Devlin, AA vice president, said the operation has yielded new business and regularity transcontinental flights have not suffered.

► **Boeing**—During April earned 54 percent over substantial gains from its previous month. Company announced U.S.-Bureau Air carrier last week. Through the Institute of International Education, Boeing will provide low cost flights for transport from each year for 25 Latin American students taking graduate work in the U.S. and 25 U.S. students studying in Latin American countries.

► **British European Airways**—WILL order 25 Vickers Viscount Type 200 bi-prop transport, designed to carry 40 passengers at 110 mph cruising speed on both conventional routes in London-Rome, Rome-Vancouver 200 to do it by this summer. A similar prototype Viscount has been flying since July, 1948. B.E.A. earned 713,512 passengers in the year ended March 31—a gain of 33 percent over the previous year.

► **EQAC**—Gained 49,478 revenue passengers in first quarter 1950, against 34,544 in the same 1949 period. Mile and cargo traffic also gained.

► **California Central Airlines**—The San Francisco-based carrier has asked CAAI for a certificate to carry persons and property (no mail) between San Francisco, Oakland, Los Angeles and San Diego. Since starting service in January, 1949, CCA has moved about 100,000 passengers on its route. The airline has 100,000 passengers and over 8000 tons of freight in Berkeley and San Diego.

► **Continental**—Has completed its first mail order of scheduled freight operation with Beech Bonanza. Since starting service last September, the carrier has handled 3321 passengers and 132,195 lb. of cargo and mail. It made nearly 20,000 landings and takeoffs on its 24-city system in Texas, Oklahoma and Kansas.

► **Frontier**—Officers of the new leader, formed by merger of Challenge Airlines and Midwest Air Lines, are: H. S. Dyer, president; C. A. Mylon, Donald Duff and R. M. Wilson, vice presidents, and Earl Lewis, secretary. General offices of Frontier will be at St. Stephen Field, Denver, while headquarters at Memphis and Challenge were located.

► **Los Angeles Airways**—Shawley 5-51 helicopter delivered to LAA in August, 1947, has logged over 1400 hr. Two other 5-51s have flown over 2500 hr.

► **The American**—Has started the first scheduled landplane service to Guadalupe and Matanzas to coincide with opening of new airports on the French West Indies Islands. The new ships are on PAA's Puerto Rico-Toronto route. PAA closed all passenger bookings to Europe with addition of a second daily flight to London on June 1. Also Manufacturing Co. has ordered 30,565,954 shares of PAA.

Avco was PAA's largest stockholder, owning 5.97 percent.

► **Philadelphia International Airport**—Contracts totaling \$7,180,000 for a new terminal building have been awarded. Balfour Beatty-type structure will be constructed. Financing will be loaned directly from the second issue of the Region in three phases by prepayment.

► **Robinson**—Carroll a record of 82 passengers in April and had a 99.6 percent completion factor. The leader has received a temporary exemption to serve Union-Rose, N. Y.



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The Feeders Should Organize

A feeder airline seminar was held the other day at the University of Oklahoma. The businessmen proved again that the feeder lines have their own difficulties, that their trunk line bosses don't have now and never will have.

It appears to us that the problems of the trunk lines and the feeders are getting less and less every day.

Isn't it high time that the feeder airlines of the country band together in a strong association of their own to fight their own battles? They once had a rather weak promotional set-up called the Feeder Airlines Association. This was dissolved before it had a real chance to function because the members one by one joined the Air Transport Association so they were their enemies of convenience and necessity. A Feeder Airlines Convention of the ATA was announced when FAA died, but it has never done anything.

We think the feeders should belong to ATA, but they need their own viable organization, too, to conduct their own business and go to bat for their cause.

The Corporation and Bad News

The managing editor of *Fortune* magazine delivered himself of a speech before the Seventh National Conference of Business Public Relations Executives that deserved more publicity in industry than it got.

Ralph D. Paine, Jr., told the public relations chiefs (and we hope some aircraft company people were there) that he suspects no one yet fully understands the role of the modern public-owned corporation in society. It is a wholly new institution. It merits an enormous force. It is run partly for the stockholders, partly for the government, partly for the consumer, partly for labor—not primarily for any one group.

"The health and the continuity of the corporation itself has become management's ultimate responsibility. The corporation is run for the corporation." That is Mr. Paine's contention.

Same contention today, when thinking of the continuity of the corporation, has been lively to think 50 to 100 years ahead. They conceive their ultimate responsibility as a responsibility to the corporation. They see the corporation as an institution in which the interest of many groups must be harmonized for mutual benefit—stockholders, labor, customers, suppliers, the national interest and that most formidable thing called public opinion.

If the modern corporation is so newfangled, the function of a critical business press becomes clearer. To the executive who only has to worry about maximizing his profit and maintaining his loans, the critical business press has little interest. With some publication he can say to business paper editors, "My business is none of your business."

But not the modern corporation as it now evolves. That is everybody's business, and the management needs a truly critical press in the same sense that

government needs a truly critical political press, Mr. Paine believes.

Whereas political journalism always finds someone who has a special interest in telling the "authoritative" story, business journalism is unique in that it appeals seldom to anybody's interest to tell. "Bad news is exceedingly hard to come by, while it is still fresh, particularly corporate news," Mr. Paine has noticed, along with some of the rest of us.

"Even competitors close up when bad news is in the wind. One has to deal with a conspiracy of silence, a sort of we-wouldn't-be-in-the-same-club attitude," Mr. Paine points out. "I find this attitude hard to understand. If business men are all in the same club, then the club is surely suspect, for there are some pretty unattractive, if not dangerous, characters playing poker upstairs."

Business got in the doghouse originally because of the actions of a few particular misdeeds, not because of the actions of business men in general, the speaker recalls. "But do good business men, even anonymously, speak out against bad business men? No. Why not? I don't know. But if business is going to be for club life, ordinary prudence, it seems to me, would dictate at least two clubs—a respectable club and one for the misdeeds."

Mr. Paine emphasizes that the problem is bad news, not just news. The publicists have made it increasingly easy to get good news. Usually, this is referred to as "legitimate" news, "legitimate" news might be defined as good news plus any bad news the law compels you to reveal, he says.

Then Mr. Paine let the publicity men have both barrels.

"It is your problem as well as mine. Because it is yours in your interest, and thus to the interest of American business economy, to have a press that the people believe. The credibility of the press as it affects business is of the utmost importance. No small part of the popular credulity against business in the 1930's was the result of the false statements created by so much silly, untruthful, puffery that passed for business journalism in the Twenties."

"The picture we should strive to impart upon the public is the picture of the American business economy as it really is, a true picture—like everything in life, partly good, partly bad, on balance much more good than bad, but certainly the best that man has yet devised for solving the age old problem of making a living."

The American temperament being what it is, normally optimistic and energetic, but extremely volatile, it is dangerous to overplay good news, to over-emphasize the success story, to mistake the spectacular for solid achievement, Mr. Paine warns. Certainly, the business press has been guilty of all these. We agree with *Fortune's* managing editor that there has been entirely too much press agency both in business and in the business press. It has impaired the credibility of the press and it has done business more harm than good.

—Robert H. Wood.

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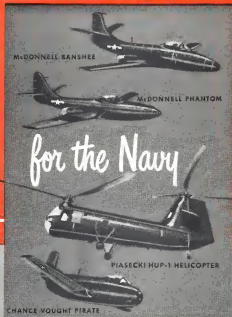
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